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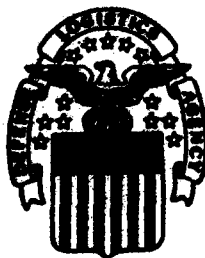
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**CATALOGING-TOOLS-ON-LINE (CTOL)
AUTOMATED INFORMATION SYSTEM (AIS)
ECONOMIC ANALYSIS**

OPERATIONS RESEARCH AND ECONOMIC ANALYSIS OFFICE

DECEMBER 1988

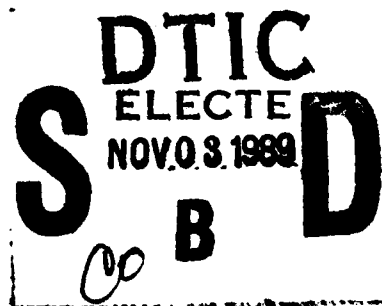


DEPARTMENT OF DEFENSE

DEFENSE LOGISTICS AGENCY

CAMERON STATION,

ALEXANDRIA, VIRGINIA 22304-6100



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Cataloging-Tools-On-Line (CTOL) Automated Information System (AIS)
Economic Analysis

December 1988

Mrs. Janet W. Rider
Operations Research and Economic Analysis Office
Headquarters Defense Logistics Agency
Cameron Station, Alexandria, Virginia



DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

DLA-LO

FOREWORD

Current DLA cataloging operations use a manual information system to prepare new item requests and maintain existing cataloging transactions. This economic analysis assesses the economic feasibility of replacing the current manual operations with a Cataloging-Tools-On-Line (CTOL) Automated Information System (AIS) as a part of the Standard Automated Materiel Management System (SAMMS) modernization. This analysis is an update of the original economic analysis which was performed in August 1986.

In the economic analysis, comparison analyses of costs and benefits are done between the current method of operation and the CTOL AIS proposal. Sensitivity analyses are performed on significant costs of the AIS proposal in order to address uncertainty in future cost estimates, and to determine what effect any variation in these costs will have on the payback period. Conclusions are drawn, based on the results of the economic analysis. → See p. 41

The results of the economic analysis update continue to show that the CTOL AIS is economically feasible. This economic analysis was performed on the first phase only of a three phase plan to enhance the overall efficiency of the Federal Catalog System.

Christine L. Gallo

CHRISTINE L. GALLO
Deputy Assistant Director
Policy and Plans

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EXECUTIVE SUMMARY

↓ SAMMS ↓
A major goal of ~~the Standard Automated Materiel Management System (SAMMS)~~ is to improve the Federal Catalog System's overall efficiency. Part of this goal is to improve SAMMS support to the five Defense Supply Centers (DSCs), the Defense Personnel Support Center (DPSC) and the Defense Industrial Plant Equipment Center (DIPEC). Thus, a Cataloging Tools On-Line (CTOL) Automated Information System (AIS) is under consideration. This state-of-the-art system is designed to include minicomputers with optical storage and workstations consisting of video display terminals, keyboards, and magnetic disk storage. (K F)

This study provides an updated cost/benefit analysis of such a system. Two alternatives are considered: the current manual system in Supply Center cataloging operations, and the CTOL AIS. The analysis time horizon is the remaining 13 years (FY88-00) of the 15-year project life (FY86-00). Costs are stated in FY88 dollars. ↑

Total discounted life-cycle costs for the current operation are \$6,474,000; this includes costs for Four-Phase equipment replacement, operating personnel, equipment maintenance, and supplies. Discounted life-cycle costs for the CTOL AIS are \$49,249,000; this includes costs for hardware, hardware replacement, site preparation, program management, initial training, residual value of replaced equipment and support investment. The CTOL AIS has a life-cycle savings/investment ratio of 1.22; its operating and support cost savings and functional personnel savings will allow full recovery of its initial investment costs within 10.1 years, or 6.1 years after full operation begins. The CTOL AIS will require an estimated 299 fewer personnel to support Supply Center cataloging operations.

A sensitivity analysis reveals that the CTOL AIS is economically preferable to the current environment so long as:

1. CTOL AIS investment costs are less than \$22,100,000. (The study's best estimate is \$18,133,000.)
2. CTOL AIS recurring (operations and support) costs do not exceed the study's best estimate of \$6,051,000 annually by more than 17%.
3. CTOL AIS functional personnel savings do not decrease from the study's best estimate (299 personnel, saving \$9,226,000 annually) by more than 8.3%. These savings are a result of the following benefits in cataloging operations if CTOL is implemented.
 - a. Improved processing time (\$5,324,000 annually).
 - b. Improved work quality (\$884,094 annually).
 - c. Improved work control (\$3,018,123 annually).

I. OBJECTIVE. The objective is to analyze the economic feasibility of a Cataloging Tools On-Line (CTOL) Automated Information System (AIS) as an integral part of the modernization of the Standard Automated Materiel Management System (SAMMS). Major aims of the CTOL application are to improve processing time, work quality, and work control.

II. BACKGROUND

Currently, in cataloging operations at the five Defense Supply Centers, the Defense Personnel Support Center (DPSC), and the Defense Industrial Plant Equipment Center (DIPEC), the development of item identifications for new National Stock Number (NSN) requests and maintenance to existing item supply are primarily manual operations. These manual operations require significant personnel resources and long administrative leadtimes. Thus, the Cataloging Tools On-Line Automated Information System is being proposed to replace the current manual system. The various "cataloging tools" (or reference data) used in cataloging operations include engineering drawings, Federal Item Identification Guides (FIIGs), Government Industrial Specification Standards, commercial catalogs, cataloging handbooks and the Defense Integrated Data System (DIDS) Procedures Manual (DoD 4100.39-M, Vol. 10), which includes multiple application references, instructions, tables, and grids. Implementation of the CTOL AIS will not change the work to be done, but it will completely change the methods used to accomplish this work. The economic considerations of two alternatives, the current manual system and the proposed automated system, will be addressed.

In FY86-87, a CTOL prototype was designed, developed, and fully implemented at the Defense Construction Supply Center (DCSC) in Columbus, Ohio. It features four workstations, CPU with optical storage, aperture and hardcopy digital scanners and a laser printer. Cataloging tools consisting of ten FIIGs are on-line and approximately 12,000 NSNs have been entered into the system. Defense Logistics Services Center (DLSC) which maintains the Federal Supply Catalog System is experiencing a significant reduction in returns due to the fact that edit validations in the CTOL prototype have eliminated rejects.[1]

III. ALTERNATIVES

Alternative A is the current manual system utilized in cataloging operations. Current operations require a large volume of paperwork passing through multiple steps of several manual processes. These processes involve manual completion, review, and control of transactions. Production and management reports are also produced manually. The Four-Phase equipment provides the only automation under this system and is used for data entry alone. As a manual operation, the current procedures work satisfactorily, but the current system may not be adequate to support the volumes of data needed if future workload increases appreciably.[2] Under this system, the "cataloging tools" are recorded on microfiche, hardcopy, and 35 millimeter film.

Alternative B is the proposed CTOL Automated Information System for cataloging operations. The CTOL AIS will use state-of-the-art technology including minicomputers with optical storage and workstations (video display terminals and keyboards).[3,4] It will be capable of supporting cataloging operations at DCSC, Defense Electronics Supply Center (DESC), Defense General

Supply Center (DGSC), Defense Industrial Supply Center (DISC), Defense Fuel Supply Center (DFSC), DIPEC, and DPSC. The hardware configuration is sized to handle a three-fold workload increase over the CTOL AIS operating life. The CTOL will interface with numerous databases including Defense Integrated Data System's Total Item Record (DIDS TIR), Technical Information Storage and Control Application (TISCA), and the Provisioning Control File. The on-line access to "cataloging tools" databases will be accomplished through the workstations. The cataloging technicians at each workstation will be able to access, select, review, and copy designated databases directly. The automated system will store, process, and transmit data. Data to be stored in the automated system will consist of both graphic and text data. It will be input by keystroking, scanning, and magnetic disk/tape. Data to be processed will consist of cataloging transactions developed on-line at the workstations. Data to be transmitted will consist of catalog transactions developed at workstations and transmitted to SAMMS via tape, interrogation requests/replies to and from above-mentioned databases, periodic maintenance to CTOL databases transmitted from Defense Logistics Support Center (DLSC) to DSCs and DPSC over AUTODIN, and technical data.

In addition to Cataloging Operations, ADP equipment will also be installed in the Technical Data Management Office (TDMO) and Technical Services at each center. While CTOL is a short-term repository for provisioning and cataloging reference materials, the TDMO supervises a long-term repository for reference materials, primarily, engineering drawings for reprourement rights. As a part of the CTOL environment, they will be able to digitize their drawings at the request of Cataloging Operations. When automated, Technical Services will work directly with the catalogers performing item entry control functions which are not a part of the item identification process. This will allow them to obtain cataloging information more quickly, avoid duplication, etc.

IV. ASSUMPTIONS

The assumptions of this economic analysis are as follows:

A. The project life for the CTOL AIS is 15 years beginning in FY86. (The CTOL AIS is being designed to accommodate the Centers' cataloging needs through the 1990s.)[3] The first 6 years are lead time years. This EA update analyzes the 13 year period FY88-00.

B. The useful life of the workstations is 8 years, while the replacement cycle is 5 years. The useful life of the other ADP equipment is 10 years and the replacement cycle is 8 years. Thus, at time of replacement, ADP equipment will have a trade-in value.

C. Workload for Item Identification/Cataloging will remain constant throughout the life cycle.

D. No military construction will be required.

E. Replacement of Four-Phase equipment, necessary in project year 3 if current operations continue, will not be replaced that year if Alternative B is selected.[5]

F. There will be no increase in personnel requirements during the life of the project.

G. A 10% management overhead cost is included in personnel costs.

H. Processing time required to complete a process in a cataloging transaction is the same at all centers.

V. COSTS

A breakdown of both one-time costs and annual recurring costs for Alternative A is presented in Appendix A. A similar breakdown is provided for Alternative B in Appendix B. Appendix D includes sunk costs for FY86-87.

Table 1 provides a summary of the costs for both alternatives. All discounted costs are stated in FY88 dollars where FY88 is the third year of the project. The standard discount rate is 10%.[6] All costs incurred prior to FY88 are considered sunk costs and will not be included in any comparison or sensitivity analyses analyzing future costs.

For the annual recurring costs, since each year's cost is multiplied by a different discount factor, the costs cannot be stated as discounted costs in the Cost Summary Table (Table 1). Therefore, the annual recurring costs under Alternative B represent annual costs beginning in Project Year 5 (FY92) when the CTOL AIS would be in full operation. The annual costs during the leadtime years are reflected in the cumulative recurring costs.

Table 1

COST SUMMARY (\$000)

<u>NONRECURRING COSTS</u>	<u>ALTERNATIVE A</u> <u>(Appendix A)</u>		<u>ALTERNATIVE B</u> <u>(Appendix B)</u>	
	<u>CONSTANT</u> <u>DOLLARS</u>	<u>DISCOUNT</u> <u>DOLLARS</u>	<u>CONSTANT</u> <u>DOLLARS</u>	<u>DISCOUNT</u> <u>DOLLARS</u>
System Investment				
Hardware	\$ 3,453	\$ 2,272	\$ 27,066	\$ 15,119
Commercial Software	0	0	6,218	4,592
Database	0	0	616	509
Documentation	0	0	98	72
Program Management	0	0	220	167
Integration	0	0	367	189
Test/Evaluation	0	0	48	25
Support Investment				
Site Preparation	0	0	80	59
Initial Training	0	0	874	640
less residual value	(599)	(174)	(11,169)	(3,239)
Total nonrecurring costs		\$ 2,098		\$ 18,133
<u>Annual Recurring Costs</u>				
Personnel	2		0	
Equip Maintenance	569		2,461	
Software Maintenance	0		3,495	
Database Maintenance	0		48	
Other	45		47	
Cumulative Recurring Costs		4,376		31,116
Total Discounted Costs		\$ 6,474		\$ 49,249

VI. COST ANALYSIS

A. Cost Comparison Analysis. Whether to continue with the manually operated system or to convert to an automated data system is analyzed by first comparing the total discounted costs for each alternative over the remaining 13 years of the project life. These life cycle costs are presented in Table 3 for Alternative A and Table 4 for Alternative B.

B. Savings/Investment Ratio (SIR).[6] To measure the economic soundness of the Alternative B investment, the ratio of the discounted life-cycle annual cost savings plus functional personnel savings to the total discounted AIS investment costs may be calculated. This savings/investment ratio (SIR) compares the cost/ benefit savings to the investment costs necessary to effect those cost/benefit savings. The cost savings of Alternative B include the difference in recurring costs of the two alternatives plus functional personnel savings plus any planned one-time Alternative A costs which may be avoided by implementing Alternative B. If the SIR is equal to one, then the present value of the cumulative investment costs equals the present value of the cumulative cost savings and cumulative functional personnel savings (See VIII. Benefits.) needed to recoup the investment in the proposed AIS. Thus, for an investment to be economically sound, the SIR must be greater than or equal to one. A SIR less than one indicates that the Alternative B investment will never be recouped, in which case, it would not be an economically worthwhile investment. Table 2 shows the calculations for the Alternative B SIR.

Table 2

SAVINGS/INVESTMENT RATIO

Fiscal Year	Investment Costs (\$000)	Discount Factor	Discounted Investment Costs (\$000)	O & S Cost Savings (\$000)	Functional Personnel Savings (\$000)	Total Discounted Savings (\$000)
88	44	.909	40	476	0	435
89	1378	.826	1138	344	369	589
90	15234	.751	11441	(3330)	6643	2488
91	5581	.683	3812	(5234)	9134	2664
92	199	.621	124	(5435)	9226	2354
93	0	.564	0	(4476)	9226	2679
94	86	.513	44	(5435)	9226	1945
95	2652	.467	1238	(5435)	9226	1770
96	1206	.424	511	(5435)	9226	1607
97	388	.386	150	(5435)	9226	1463
98	4448	.350	1557	(4476)	9226	1663
99	1718	.319	548	(5435)	9226	1209
00	(8517)	.290	(2470)	(4836)	9226	1273
Totals			18133			22137

TABLE 3
LIFE-CYCLE COST ELEMENT STRUCTURE
ALTERNATIVE A
(000s)

COST ELEMENT		FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	TOT COSTS

* 1	SYSTEMS INVESTMENT	1,535	0	0	0	0	959	0	0	0	0	959	0	0	3,453
* 2	CONTRACTOR PROVIDED	1,535	0	0	0	0	959	0	0	0	0	959	0	0	3,453
* 3	PROGRAM MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 4	HARDWARE	1,535	0	0	0	0	959	0	0	0	0	959	0	0	3,453
* 5	ADP EQUIPMENT	1,535	0	0	0	0	959	0	0	0	0	959	0	0	3,453
* 6	TELECOMMUNICATIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 7	DATABASE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 8	SOFTWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 9	SOFTWARE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 10	SOFTWARE COMMERCIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 11	DOCUMENTATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 12	TEST AND EVALUATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 13	TECH/INTEGRATION SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 14	GOVERNMENT PROVIDED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 15	PROGRAM MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 16	HARDWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 17	ADP EQUIPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 18	TELECOMMUNICATIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 19	SOFTWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 20	SOFTWARE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 21	SOFTWARE GOVT FURNISHED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 22	TEST AND EVALUATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 23	INTEGRATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 24	OTHER														0
* 25	SUPPORT INVESTMENT	616	616	616	616	616	616	616	616	616	616	616	616	616	8,008
* 26	NONRECURRING COSTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 27	SITE PREPARATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 28	INITIAL TRAINING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 29	RECURRING COSTS	616	616	616	616	616	616	616	616	616	616	616	616	616	8,008
* 30	PERSONNEL	2	2	2	2	2	2	2	2	2	2	2	2	2	26
* 31	OPERATIONS	2	2	2	2	2	2	2	2	2	2	2	2	2	26
* 32	MAINTENANCE	569	569	569	569	569	569	569	569	569	569	569	569	569	7,397
* 33	ADP EQUIPMENT	569	569	569	569	569	569	569	569	569	569	569	569	569	7,397
* 34	DATABASE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 35	SOFTWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 36	SUPPLIES	45	45	45	45	45	45	45	45	45	45	45	45	45	585
* 37	TRAVEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 38	OTHER														(599)
* 39	TERMINAL VALLE														(599)
* 40	TOTAL COSTS/YEAR	2,151	616	616	616	616	1,575	616	616	616	616	1,575	616	17	10,862
* 41															
* 42	DISCOUNT FACTOR	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386	0.350	0.319	0.290	
* 43															
* 44	TOTAL DISCOUNTED COSTS/YEAR	1,955	509	463	421	383	888	316	288	261	238	551	197	5	6,474
* 45															

TABLE 4
LIFE CYCLE COST ELEMENT STRUCTURE
ALTERNATIVE B
(000s)

* COST ELEMENT	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	TOT COSTS
* 1 SYSTEMS INVESTMENT	44	1,320	14,633	5,305	180	0	86	2,652	1,206	388	4,448	1,718	2,652	34,633
* 2 CONTRACTOR PROVIDED	0	1,273	14,487	5,214	133	0	83	2,550	1,159	385	4,448	1,715	2,550	33,998
* 3 PROGRAM MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 4 HARDWARE	0	510	9,640	3,893	133	0	83	2,550	1,159	385	4,448	1,715	2,550	27,066
* 5 ADP EQUIPMENT	0	510	9,640	3,893	133	0	83	2,550	1,159	385	4,448	1,715	2,550	27,066
* 6 TELECOMMUNICATIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 7 DATABASE DEVELOPMENT	0	616	0	0	0	0	0	0	0	0	0	0	0	616
* 8 SOFTWARE	0	145	4,772	1,301	0	0	0	0	0	0	0	0	0	6,218
* 9 SOFTWARE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 10 SOFTWARE COMMERCIAL	0	145	4,772	1,301	0	0	0	0	0	0	0	0	0	6,218
* 11 DOCUMENTATION	0	2	75	20	0	0	0	0	0	0	0	0	0	98
* 12 TEST AND EVALUATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 13 TECH/INTEGRATION SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 14 GOVERNMENT PROVIDED	44	47	146	91	47	0	3	102	47	3	0	3	102	635
* 15 PROGRAM MANAGEMENT	44	44	44	44	44	0	0	0	0	0	0	0	0	220
* 16 HARDWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 17 ADP EQUIPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 18 TELECOMMUNICATIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 19 SOFTWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 20 SOFTWARE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 21 SOFTWARE GOVT FURNISHED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 22 TEST AND EVALUATION	0	0	12	6	0	0	0	12	6	0	0	0	12	48
* 23 INTEGRATION	0	3	90	41	3	0	3	90	41	3	0	3	90	367
* 24 OTHER														0
* 25 SUPPORT INVESTMENT	140	330	4,547	6,126	6,070	6,051	6,051	6,051	6,051	6,051	6,051	6,051	6,051	65,621
* 26 NONRECURRING COSTS	0	58	601	276	19	0	0	0	0	0	0	0	0	954
* 27 SITE PREPARATION	0	10	50	20	0	0	0	0	0	0	0	0	0	80
* 28 INITIAL TRAINING	0	48	551	256	19	0	0	0	0	0	0	0	0	874
* 29 RECURRING COSTS	140	272	3,946	5,850	6,051	6,051	6,051	6,051	6,051	6,051	6,051	6,051	6,051	64,667
* 30 PERSONNEL	2	2	2	2	0	0	0	0	0	0	0	0	0	8
* 31 OPERATIONS	2	2	2	2	0	0	0	0	0	0	0	0	0	8
* 32 MAINTENANCE	91	223	3,897	5,801	6,004	6,004	6,004	6,004	6,004	6,004	6,004	6,004	6,004	64,048
* 33 ADP EQUIPMENT	43	175	3,849	5,753	5,956	5,956	5,956	5,956	5,956	5,956	5,956	5,956	5,956	63,424
* 34 DATABASE	48	48	48	48	48	48	48	48	48	48	48	48	48	624
* 35 SOFTWARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 36 SUPPLIES	45	45	45	45	45	45	45	45	45	45	45	45	45	585
* 37 TRAVEL	2	2	2	2	2	2	2	2	2	2	2	2	2	26
* 38 OTHER													(11,169)	(11,169)
* 39 TERMINAL VALUE													(11,169)	(11,169)
* 40 TOTAL COSTS/YEAR	184	1,650	19,180	11,431	6,250	6,051	6,137	8,703	7,257	6,439	10,499	7,769	(2,466)	89,385
* 41														
* 42 DISCOUNT FACTORS	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386	0.350	0.319	0.290	
* 43														
* 44 TOTAL DISCOUNTED COSTS/YEAR	167	1,363	14,404	7,808	3,881	3,413	3,148	4,064	3,077	2,485	3,675	2,478	(715)	49,249
* 45														

SIR

$$= \frac{PW_S}{PW_I}$$

$$= \frac{\text{Disc O\&S Cost Savings} + \text{Disc Functional Personnel Savings} + \text{Cost Avoidances} - \text{Terminal Value (Alt A)}}{\text{Total Discounted Investment Costs}}$$

$$= \frac{\$22,137}{\$18,133}$$

$$= 1.22$$

Since the SIR is greater than 1.00, the investment is economically sound.

Cost avoidances of \$959,000 for Alternative A ADP equipment replacements are included with the O&S cost savings in FY93 and FY98. The terminal value of Alternative A ADP equipment is subtracted from the O&S cost savings in FY00.

C. Discounted Payback Analysis. The discounted payback period represents the time it takes for Alternative B's cumulative discounted cost savings and cumulative functional personnel savings to recoup the cumulative discounted investment costs.[7] The investment costs represent the sum of the initial and replacement investment costs less the terminal value of investment at the end of the project life. For Alternative B, the discounted payback calculations are presented in Table 5. In the Cumulative Discounted Savings column of Table 5, it can be seen that in FY98, the cumulative discounted savings at this point exceed the cumulative discounted investment costs for the life of the project. The discounted investment cost occurring after FY98 is -\$1,922,000. If this is added to the cumulative (discounted) FY98 investment, \$20,055,000, the total is \$18,133,000. The cumulative discounted savings through FY98, \$19,655,000, are sufficient to amortize this total. Thus, the payback period for the remaining 13 years of the project life for Alternative B is 10.1 years.

ALTERNATIVE B INVESTMENT COSTS WITH SAVINGS HELD CONSTANT

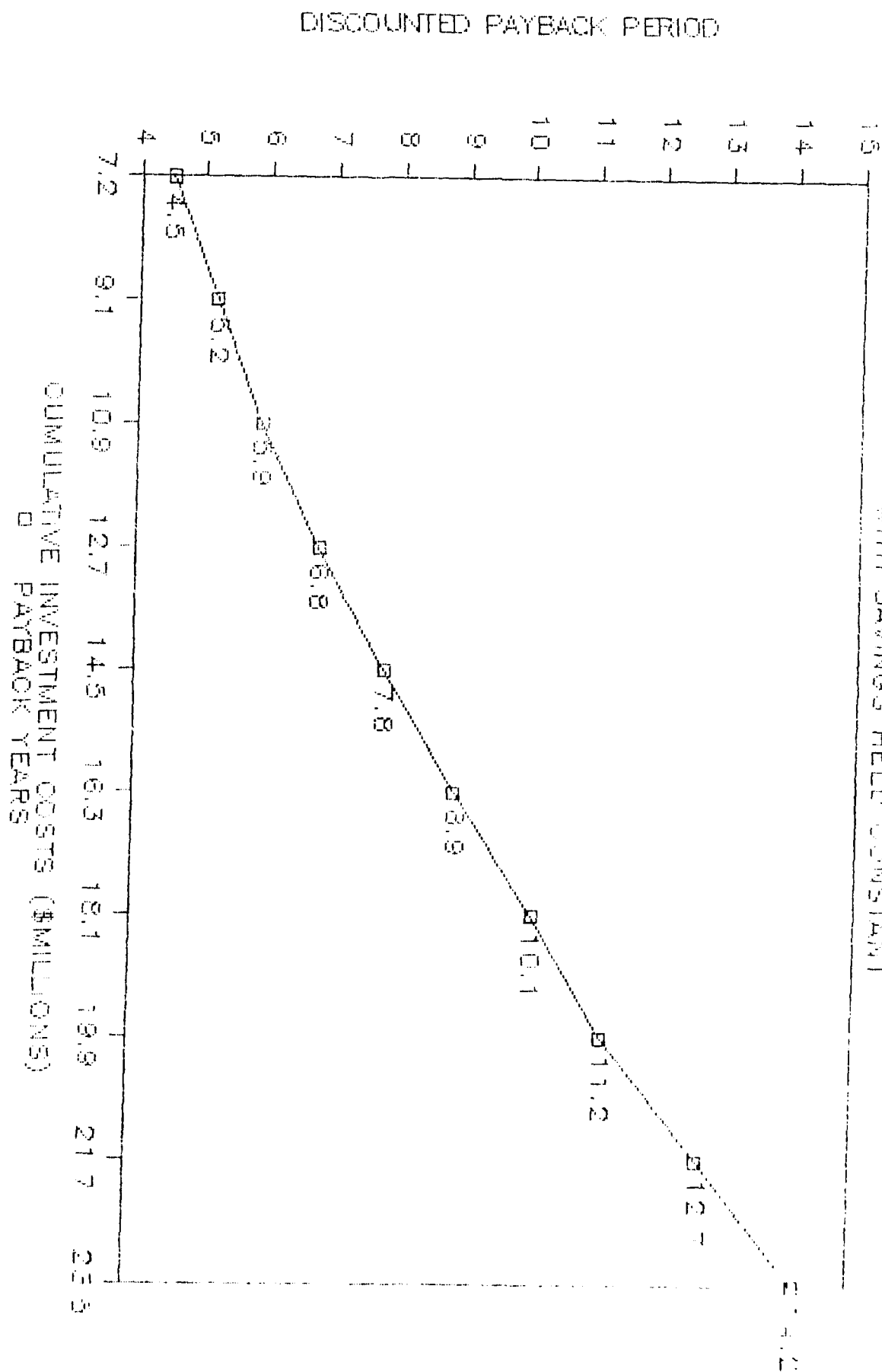


TABLE 5
DISCOUNTED PAYBACK CALCULATIONS

FISCAL YEAR	INVESTMENT COSTS (\$000)	DISCOUNT FACTOR	DISCOUNTED INVESTMENT COSTS (\$000)	CUMULATIVE DISCOUNTED COSTS (\$000)	COST SAVINGS (\$000)	FUNCTIONAL PERSONNEL SAVINGS (\$000)	TOTAL SAVINGS (\$000)	DISCOUNTED TOTAL SAVINGS (\$000)	CUMULATIVE DISCOUNTED SAVINGS (\$000)
88	44	0.909	40	40	476	0	476	433	433
89	1,378	0.826	1,138	1,178	344	369	713	589	1,022
90	15,234	0.751	11,441	12,619	(3,330)	6,643	3,313	2,488	3,510
91	5,581	0.683	3,812	16,431	(5,234)	9,134	3,900	2,664	6,173
92	199	0.621	124	16,554	(5,435)	9,226	3,791	2,354	8,527
93	0	0.564	0	16,554	(4,476)	9,226	4,750	2,679	11,206
94	86	0.513	44	16,598	(5,435)	9,226	3,791	1,945	13,151
95	2,652	0.467	1,238	17,837	(5,435)	9,226	3,791	1,770	14,921
96	1,206	0.424	511	18,348	(5,435)	9,226	3,791	1,607	16,529
97	388	0.386	150	18,498	(5,435)	9,226	3,791	1,463	17,992
98	4,448	0.350	1,557	20,055	(4,476)	9,226	4,750	1,663	19,655
99	1,718	0.319	548	20,603	(5,435)	9,226	3,791	1,209	20,864
00	(8,517)	0.290	(2,470)	18,133	(4,836)	9,226	4,390	1,273	22,137

Cost avoidances of \$959,000 for Alternative A ADP equipment replacements are included in the O&S cost savings in FY93 and FY98. The terminal value of Alternative A ADP equipment is subtracted from the O&S cost savings in FY00.

VII. SENSITIVITY ANALYSES

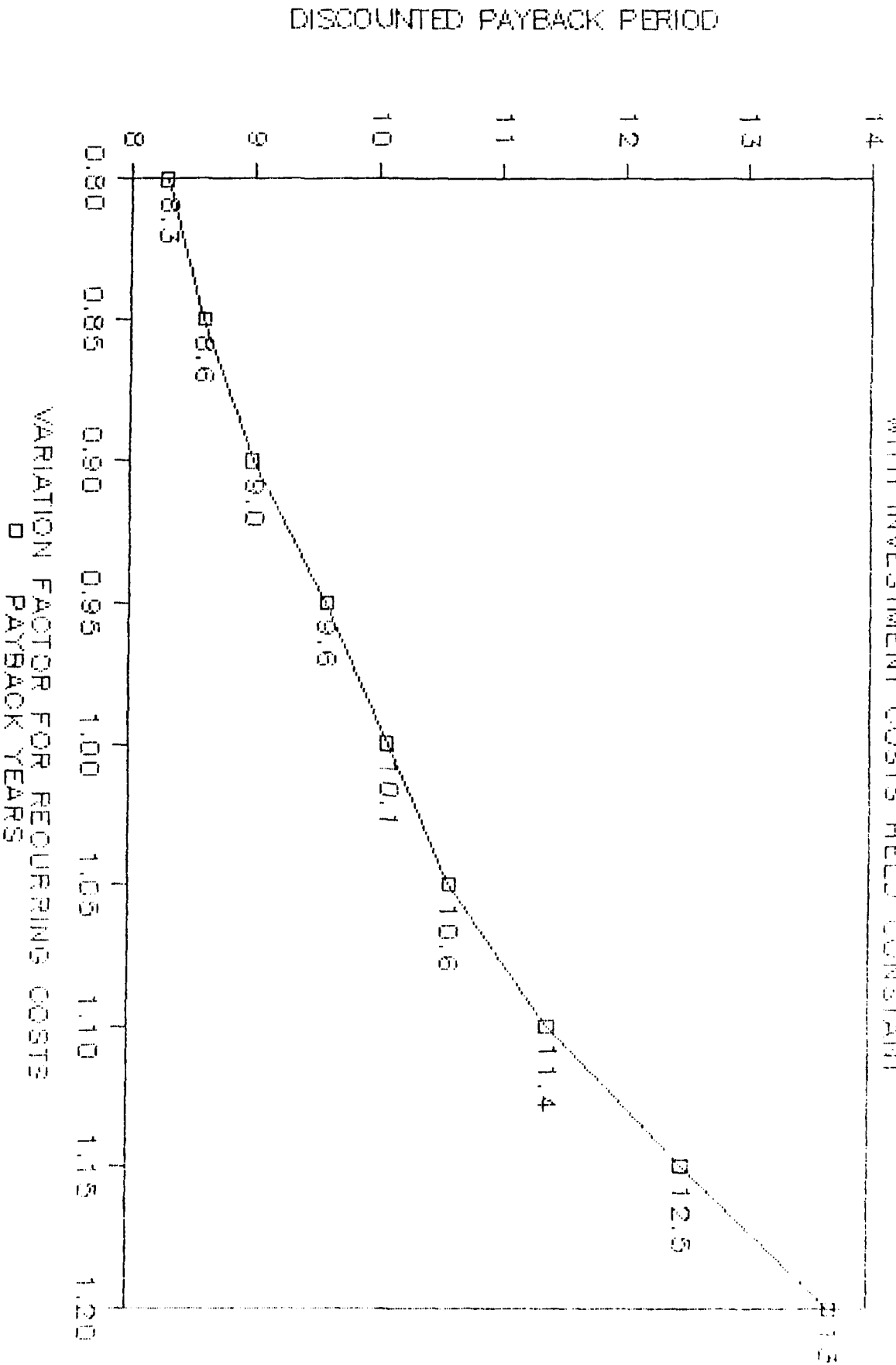
In this section, sensitivity analyses are performed on two cost areas in this economic analysis. They are investment costs and operations/support costs for Alternative B. These are performed to determine how the discounted payback period will be affected if variations in the best estimates of the costs should occur over the remaining 13 years of the 15-year project life. While costs for the particular cost area are varied, all other costs are held fixed. Investment costs and operations/support costs were selected for further analysis since they are the dominant costs in the EA, and any changes in these costs due to unforeseen circumstances could significantly influence the economic feasibility of the AIS proposal. Graphical representations of the cost sensitivity analyses are provided in Figures 1-2. The following are the descriptions of the cost sensitivity analyses and their results:

A. Alternative B Investment Costs. Changes in the market price of the ADP equipment at time of purchase and changes in equipment requirements are two of several reasons initial and replacement investment costs may contain future uncertainty. This sensitivity test keeps all costs except investment costs fixed and varies investment costs between -60% and +130% increments of 10%. This particular cost is being tested for two different scenarios.

1. The proposed investment as presented in this economic analysis.
2. Fully expanded scenario which includes investment in CTOL systems by the Services and other Government organizations. (See Appendix C.)

ALTERNATIVE B RECURRING COSTS

WITH INVESTMENT COSTS HELD CONSTANT



It is found that the discounted payback varies between 4.5 years and 13 years. If investment costs are varied upward by more than 22%, no payback during the life of the project exists. In the payback analysis, the discounted investment cost best estimate is \$18,133,000, and the discounted payback is 10.1 years. The results are presented graphically in Figure 1.

B. Alternative B Recurring Costs. Since the state-of-the-art system is new, operations and support requirements (support personnel, ADPE maintenance, software maintenance, database maintenance, supplies, travel) needed in the CTOL AIS environment contain a degree of uncertainty. Thus, the recurring costs for the automated system are varied between -20% and +20% in increments of 5%. The results show that if the recurring costs decrease under Alternative B, the payback period is reduced and cost savings increase. If the costs increase, the payback period increases and the Alternative B cost savings decrease further. The payback of 10.1 years determined in the economic analysis varies between 8.3 years (-20%) and 13.0 years in the sensitivity analysis. Thus, if the recurring costs increase by more than 17%, there will be no payback within the remaining 13 years of the 15-year project life. Results are shown graphically in Figure 2.

VIII. BENEFITS

A breakdown of quantifiable and nonquantifiable benefits is presented below. The quantifiable benefits include improved processing times, improved work quality and improved work control. The nonquantifiable benefits include reduced administrative leadtime and future expansion capabilities. The identification of benefits and measurement of quantified benefits are in accordance with the DLA-SCC Functional Development objective and have been approved by the DLA-SCC management.[8]

A. Quantifiable Benefits

1. Improved Processing Time. With Alternative A, development and maintenance of catalog transactions are manual processes. For Alternative B, automated steps in the item identification processes allow for faster processing time in preparing item identification data for a cataloging transaction. Faster processing times will allow cataloging operations to handle possible increases in future workload and reduce backlogs. Thus, improved processing time will increase response times for Military Service cataloging needs. In Appendix C, it is shown that improved processing times in item identification processing will allow an estimated annual functional personnel savings of \$5,324,000 (FY88 undiscounted dollars).

2. Improved Work Quality. Under current procedures, editing and validation are done separately from data identification and are often done later. When errors are detected by SAMMS, DIDS, or quality control people, the paperwork must be found, error identified, responsibility for correction assigned, and the paperwork sent there. Most of these errors are human errors due in large part to manual processing. In the CTOL AIS work quality will be improved by use of built-in edits to identify errors at time of occurrence in processing cataloging transactions. This will significantly reduce DLSC rejects, thereby eliminating the time required by the cataloging technician to control and process the rejects.[3] The errors will be identified while the cataloging technician still has the work material in hand rather than, as under the current system, after the work material has been filed away. Appendix C shows an estimated annual savings in personnel of \$884,094 (FY88 undiscounted dollars) due to improved work quality.

3. Improved Work Control. Under current procedures, paperwork is used for each step of the cataloging function. To control the paperwork on each item, it is put together as a packet. A significant amount of manpower is required to transfer these packets from one organization to another. Also, data entry is separated from identification of the data to be entered. Data are copied onto worksheets as they are identified and then these worksheets are sent to a separate group for entry. Separation of these duties provides control and efficiency, but it requires a significant amount of manpower to perform the data entry function. Then additional manpower is needed for verification since everything is entered twice. The primary area considered for automation under CTOL is work control in order to reduce the manual processing and control. Then, through use of a complete electronic audit trail, cataloging transactions can be controlled from the time they are received until they are accepted by SAMMS/DIDS. Also, improved production control by use of on-line production, efficiency, quality, backlog and control file aging reports can be realized.[3] In Appendix C, personnel savings are estimated at \$3,018,123 (FY88 undiscounted dollars) as a result of improved work control through automation and changes in methods of operation.

B. Nonquantifiable Benefits

1. Reduced Administrative Lead Time (ALT). Alternative A requires excessive ALT to obtain new NSNs. Current policies allow 60 days to obtain an NSN. This 60-day time frame will be significantly reduced by automated processing enhancements and on-line management control of the cataloging transactions. In the Accelerated Cataloging/Mechanized Entry (ACME) Feasibility and Cost Benefit Analysis it was estimated that the 60 maximum days currently required to obtain a new NSN will be reduced to 30 days, a 50% time reduction.[9] Sources of ALT delay under current system include the routine for handling errors, management workload and movement of paperwork.

2. Future Interface Capabilities. The ADP equipment for Alternative B will provide the future capability to electronically interface, from CTOL workstations, with other Military Services, DSCs, private industry and Government agencies equipment for the transfer and receipt of text and graphic data.[3] Appendix C gives a breakdown of ADP equipment requirements if other Military Services and Government organizations opt to electronically interface with the CTOL AIS. It is reasonable to assume they would realize benefits similar to presented in this EA.

C. Possible Future Benefits

1. The CTOL AIS functional experts (DLA-SC) are unable to identify potential benefits for the Technical Data Management Office (TDMO) and Technical Services at this time. However, the TDMO is being equipped with CTOL ADP equipment to meet cataloging requirements until the Navy/DLA Engineering Data Management Information and Control System (EDMICS) is implemented. The equipment designated for Technical Services will be used for training purposes as they begin plans to automate their services. Because Technical Service offices differ at each supply center, the functional experts have determined that more time is needed to analyze future personnel requirements. Currently, the plan is to train one person at each center in all of the tech services. If this occurs, there will be significant functional personnel savings.

2. Investigation is in progress to study the feasibility of centralizing all Department of Defense cataloging operations under the CTOL AIS where DLA would absorb Military Services cataloging for consummable items. That is, the DLA supply centers would do the cataloging for DLA managed items and for Military Service managed items. Potential benefits include elimination of duplication, improved accuracy in processing item identification workload, and improved customer readiness.[10]

IX. BENEFIT SUMMARY

Table 6 summarizes the incremental quantifiable benefits for Alternative B.

Table 6

SUMMARY OF INCREMENTAL BENEFITS

<u>BENEFIT</u>	<u>ANNUAL BENEFIT SAVINGS</u>
Improved Processing Times	\$5,324,000
Improved Work Quality	884,094
Improved Work Control	3,018,123
Total Annual Benefit Savings	\$9,226,217

In addition, CTOL will allow a 50% reduction in administration lead time for entering new NSNs into the system. It will also provide future expansion capabilities for electronic interface with the Military Services and other Government agencies.

X. BENEFIT ANALYSIS

A. Improved Processing Times. Through analysis of the times to complete processes presented in Table 7 below, and the time saved under Alternative B, the following observations are made:

1. Time required for the item identification request process will be reduced from 4.2 hours to 2.5 hours or a 40% time reduction.
2. Time required to enter and edit item identification data for a cataloging transaction will be reduced from 5.6 hours to 4.5 hours or a 20% reduction in time.
3. Overall time required to prepare item identification data for a cataloging transaction will be reduced from 10.0 hours to 7.0 hours or a 30% reduction in processing time.

This benefit is analyzed in X.B. in terms of functional personnel savings (as a result of improved processing times) and is detailed in Appendix C.

FIGURE 3

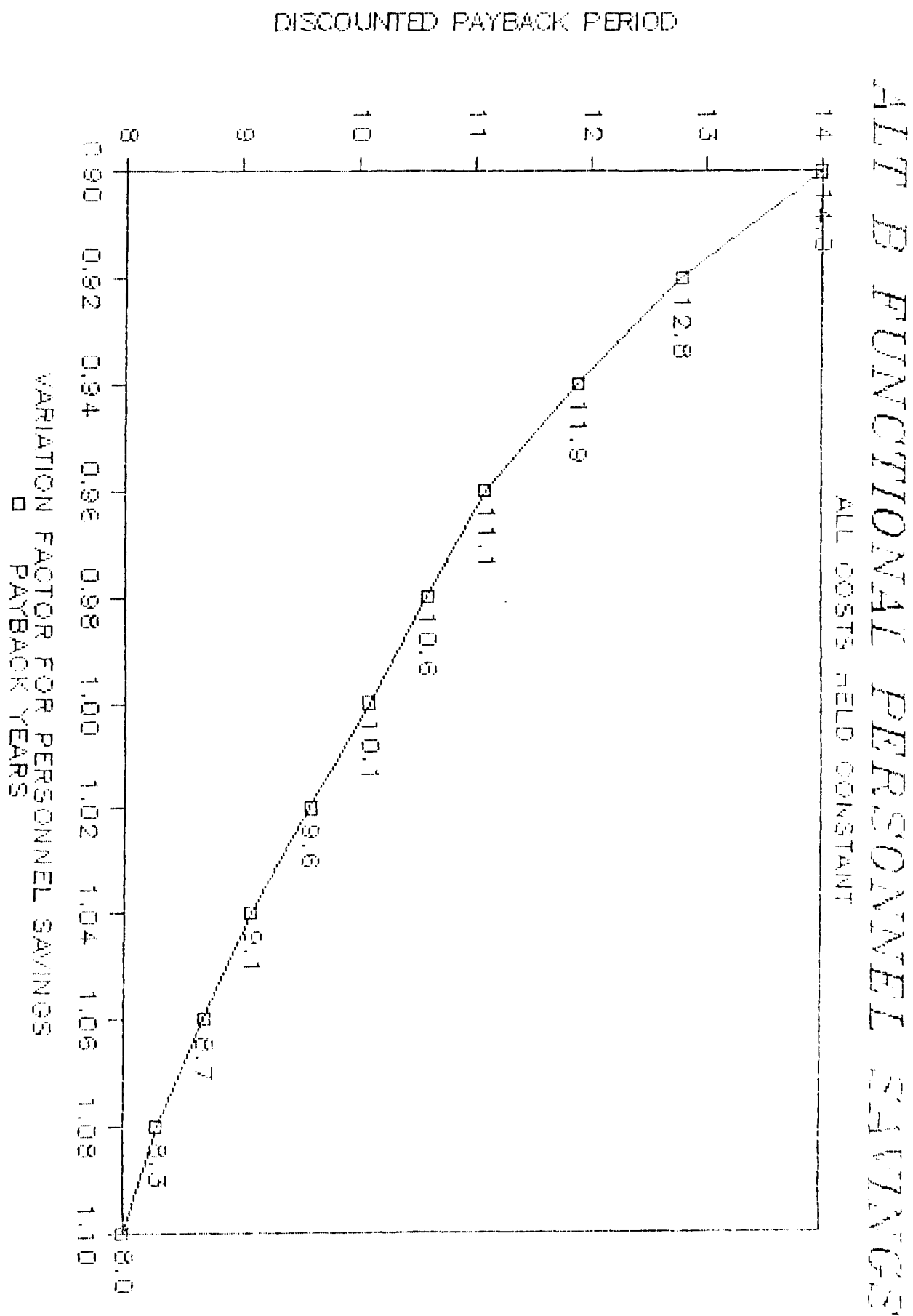


Table 7

TIME TO COMPLETE PROCESS IN HOURS
(Appendix C)

ITEM IDENTIFICATION PROCESS	ALTERNATIVE A	ALTERNATIVE B	DIFFERENCE (Hours)
Request	4.2	2.5	1.7
Transfer	1.6	1.2	.4
Revision	1.4	1.1	.3
Cancel	1.6	1.4	.2
Add, Change, Delete	1.0	.8	.2
	---	---	---
	9.8	7.0	2.8

B. Functional Personnel Savings. Functional personnel savings in cataloging operations are based on the assumption that work load will remain constant throughout the project life. Also, certain positions have been identified that will no longer be needed and thus, it is assumed the related personnel will no longer be needed. Since there are major changes in methods of operation under CTOL, uncertainty exists in future personnel requirements. A sensitivity analysis is performed to test the degree of uncertainty in functional personnel savings and the effect of the variations in the savings on the discounted payback period. Personnel savings are varied between -10% and +10% of best estimate in increments of 2%. The discounted payback varies between 8.0 years (+10%) and 13 years (-8.3%). If functional personnel savings decrease by more than 8.3 percent, there is no payback. If these savings increase by 10%, the payback period decreases by 2.1 years. The EA best estimate for annual personnel savings is \$9,226,000 beginning in FY92 with a discounted payback period of 10.1 years. Results are presented graphically in Figure 3.

X. CONCLUSIONS

The objective of this analysis was to assess the economic feasibility of the proposed CTOL AIS over the remaining 13 years of the 15-year project life. The current manual system is adequate for the current scenario, but it is the finding of this EA that the CTOL AIS is economically and operationally preferable. It will achieve an estimated cumulative discounted cost savings and personnel functional savings of \$22,137,000 in FY88 discounted dollars over the current system. The number of personnel saved will be 299 (See Appendix C.). The AIS will also pay for itself within 6.1 years after full operations begin. A SIR of 1.22 indicates the proposed AIS is an economically sound investment over the remaining 13 years of the 15-year project life cycle. If implemented, it will improve processing times for cataloging transactions and reduce administrative lead times for entering new NSNs into the system. Built-in edits to identify errors in cataloging transactions will significantly improve the quality of work. Through the use of an electronic audit trail, cataloging transactions will be controlled from the time they are received until they are accepted by SAMMS/DIDS. The CTOL AIS will also have the capability in the future to electronically interface, from CTOL workstations, with Military Services and other Government operations to better satisfy the Military Service cataloging needs.

APPENDIX A

Alternative A (STATUS QUO) Cost Sources/Derivations/Methodology

The numbers in the "Note" column correspond to the line numbers for the cost elements in Table 2, Life-Cycle Cost Element Structure for Alternative A.

<u>Note</u>	<u>Explanation</u>
-------------	--------------------

SYSTEM INVESTMENTS (CONTRACTOR PROVIDED)

3 PROGRAM MANAGEMENT

There are no contractor provided program management costs for the current alternative.

5 ADP EQUIPMENT

Four-Phase ADP equipment is currently used in Cataloging Operations at the five centers for data entry purposes only. All other item identification processes are performed manually.

If the CTOL AIS is approved, the centers will continue to use the existing ADP equipment without replacement until the CTOL AIS is fully implemented. See Note 34 for maintenance of this equipment.

If the CTOL AIS is not approved, then all Four-Phase equipment will be replaced every 5 years. This equipment has no remaining useful life. It is several years old and the original purchase date is not known.

Calculations for replacement costs are shown in Table A-1 below.

TABLE A-1

REPLACEMENT COSTS

SITE	EQUIPMENT QTY	UNIT COST	TOTAL COST
DCSC	9	\$34,110	\$ 306,990
DESC	9	34,110	306,990
DGSC	9	34,110	306,990
DISC	9	34,110	306,990
DPSC	9	34,110	306,990

Equipment replacement costs each 5 years	\$ 1,534,950
--	--------------

Equipment quantities and unit costs were provided by DLA's Office of Telecommunications and Information Systems Office (OTIS), ADP/Telecommunications Contracting Office.

6 TELECOMMUNICATIONS

Not applicable.

- 7 DATABASE DEVELOPMENT
Not applicable.
- 9 SOFTWARE DEVELOPMENT
Not applicable.
- 10 COMMERCIAL SOFTWARE
Not applicable.
- 11 DOCUMENTATION
Not applicable.
- 12 TEST AND EVALUATION
Not applicable.
- 13 TECH AND INTEGRATION SUPPORT
Not applicable.
- SYSTEM INVESTMENTS (GOVERNMENT PROVIDED)
- 15 PROGRAM MANAGEMENT
There are no Government provided program management costs.
- 17 ADP EQUIPMENT
There will be no Government provided ADP equipment.
- 18 TELECOMMUNICATIONS
There will be no Government provided ADP telecommunications costs.
- 19 SOFTWARE DEVELOPMENT
Not applicable.
- 21 GOVERNMENT FURNISHED SOFTWARE
None.
- 22 TEST AND EVALUATION
Not applicable.
- 23 INTEGRATION
Not applicable.
- 24 OTHER
None.

SUPPORT INVESTMENT

27 SITE PREPARATION

None.

28 INITIAL TRAINING

Not applicable.

31 OPERATING PERSONNEL

Operating personnel are equipment operators located in the various OTIS offices. The total Four-Phase system for DLA includes 5000 pieces of equipment. Only 45 pieces are dedicated to Cataloging Operations or .9% of the total system. Typically, one person at each center is assigned as a Four-Phase equipment operator in the OTIS office. In Table A-2 calculations for operating personnel costs are shown.

TABLE A-2

OPERATING PERSONNEL COSTS

YEARS	# SITES	ANNUAL SALARY	FRINGE BENEFIT FACTOR	PERCENT OF ANNUAL SALARY	TOTAL/YR
1-15	5	\$31,412	1.2955	.9%	\$1831

Sources:

1. Annual Salary = \$31,412 (GS 11, Step 5)
Office of Personnel Management, 1988 Pay Table for General Schedule Grades for Those Paid Every Two Weeks.
2. Fringe Benefit Rate = .2955
Circular No. A-76 Revised, Transmittal Memorandum #7, 28 September 1988

33 ADPE MAINTENANCE COSTS

Table A-3 gives annual costs by site to maintain the FOUR-PHASE equipment in cataloging operations.

TABLE A-3

ADPE MAINTENANCE COSTS

SITE	ANNUAL COSTS
DCSC	\$ 64,136
DESC	66,068
DGSC	113,312
DISC	77,828
DPSC	247,616
Total	\$ 568,960

The annual maintenance costs were obtained by DLA-DACO from the Motorola contract #DLAH00-88-D-0008.

36 **SUPPLIES**

Annual costs for supplies for both alternatives are estimated to be approximately the same. Supplies for Alternative B include laser disks and other computer supplies. DESC annual supply costs in FY84 were \$5,000. The assumption is made that supply costs are approximately the same at each center. In Table A-4, Total Obligational Authority (TOA) indices from National Defense Budget Estimates for FY88/89, OASD(C), April 1987 (Table 5-4, page 52) are used to adjust FY84 dollars to FY88 dollars.

TABLE A-4
SUPPLY COSTS

# SITES	ANNUAL COST	TOA INDEX	TOTAL ANNUAL SUPPLY COSTS
8	\$5,000	100/88.05	\$46,257

37 **TRAVEL**

No travel is involved under the current system.

40 **TERMINAL VALUE**

The terminal value of the equipment is calculated below in Table A-5 using straight line depreciation over an 8 year useful life.

TABLE A-5
TERMINAL VALUE

FISCAL YEAR	INVESTMENT	REMAINING USEFUL LIFE	TERMINAL VALUE
98	959	5/8	599

APPENDIX B

Cost Sources/Derivations/Methodology Alternative B (CTOL AIS)

Note

Explanation

The numbers in the "Note" column correspond to the line numbers for the cost elements in Table 3, Life-Cycle Cost Element Structure for Alternative B.

SYSTEM INVESTMENTS (CONTRACTOR PROVIDED)

3 PROGRAM MANAGEMENT

All program management will be accomplished by DLA's Directorate of Technical and Logistics Services, Technical and Logistics Data Division. See Note 15.

5 ADP EQUIPMENT

The CTOL unit prices for hardware (except modems) were obtained from an independent government cost estimate (IGCE) developed by the Office of Telecommunications and Information Systems, Technology Division (DLA-ZWA), and the estimate was developed using the FY87 Library of Congress contract (DHAH-8-ZSA-10) for the CTOL prototype and GSA price lists. The discounts were determined on the basis of professional experience by the DLA-ZW ADP equipment specialists.

Table B-1 provides a detailed breakdown of the CTOL hardware, contract/GSA unit prices, discounts, and DLA best estimates. The total unit price for the best estimate represents the IGCE while the component unit prices were obtained from various price lists available for the purpose of defending the best estimate.

TABLE B-1

CTOL CONFIGURATION AND UNIT COSTS				CONTRACT/ CATALOG SOURCE
DESCRIPTION	CONTRACT/ CATALOG PRICE	DISCOUNT	DLA BEST ESTIMATE	
<u>MINICOMPUTER</u>	138,465		105,606	GSA
MicroVAXII, 16 MB	69,368	35%	45,089	DEC
Hd Disk Dr, 456 Mag	24,515	35%	15,935	DEC
TapeDrive & Multiplexer	13,170	-	13,170	DEC
Syst Console w/Dig	2,584	-	2,584	DEC
User License (16)	14,250	-	14,250	DEC
DECNET License (8)	1,020	-	1,020	DEC
Ethernet Connections	1,850	-	1,850	DEC
Port Connectors (11)	1,670	-	1,670	DEC
Ethernet Cables	1,100	-	1,100	DEC
Add'l DECNET Lic Users	8,938	-	8,938	DEC
<u>MODEM</u>	475		475	Zenith AF Contract

TABLE B-1 (CONTINUED)

DESCRIPTION	CONTRACT/ CATALOG PRICE	DISCOUNT	DLA BEST ESTIMATE	CONTRACT/ CATALOG SOURCE
<u>OPTICAL DISK DRIVE</u>	70,643		70,643	Hitachi
w/Interface				
<u>APERTURE CARD SCANNER</u>	111,261		106,351	Lib of Congress Contract
AP Card Scanner	84,351		84,351	Ricoh
Controller				AMDEX
Disk Drive	4,730	-	0	
CRT Monitor (2)	1,000	-	1,000	
Keyboards (2)	400	-	400	
CPU-AT	3,900	-	3,900	Tandon
Boards (3)				
Adapter (Graphics)	1,000	-	1,000	
Compression	1,000	-	1,000	
Serial Printer	1,000	-	1,000	
Other Controller Parts	13,700	-	13,700	
Unidentifiable	180	-	0	
<u>PAPER SCANNER</u>	19,368		17,035	Lib of Congress Contract
Paper Scanner IS-4000	9,625	-	9,625	Ricoh
Controller				
CPU	1,960	-	1,960	Tandon
CRT Monitor	500	-	500	AMDEX
Keyboards (2)	1,000	-	1,000	
Interface/Connect	950	-	950	
Modification (3 boards)	3,000	-	3,000	
Unidentifiable *	2,333	-	-	
<u>LASER PRINTER</u>	14,652		6,582	Lib of Congress Contract
Printer, "A" Size	3,722	-	3,722	Ricoh
CPU	1,960	-	1,960	Tandon
Keyboard-ASCII (3)	400	-	400	
Monitor	500	-	500	AMDEX
Interface Network	4,000	-	-	
Unidentifiable *	4,270	-	-	
<u>WORKSTATIONS</u>	16,250		8,870	Lib of Congress Contract
Microcomputer	1,960 (2248)	-	1,920 (PC AT)	Zenith, IBM
Keyboard, ASCII	600	-	600	Zenith
CRT Monitor, 19"	500	-	500	Sears
Mouse & Desk Pad	100	-	100	
Black Box (Surge Breaker)	3,000	50%	1,500	
Boards (30 each workstation)	4,500	50%	2,250	
Miscellaneous (labor to	2,000	-	2,000	
mod power, circuit bds, etc)				
Unidentifiable *	3,590	-	-	

* "Unidentifiable" costs are costs that were included in the Library of Congress contract which are not explainable. Thus, they are not included in the DLA best estimate. In Table B-2 is a breakdown of the equipment requirements by year and by site. Unit costs for each type of equipment are provided as well as the total site costs.

TABLE B-2

ADP EQUIPMENT REQUIREMENTS BY SITE AND TOTAL COSTS BY SITE

EQUIPMENT/SITE	UNIT COST	FY89	FY90	FY91	FY92	TOT QTY	TOT COSTS (000s)
DCSC							
MINICOMPUTERS	105,606	1	5			6	634
WORKSTATIONS	8,870	15	75	21		111	985
APERTURE SCANNERS	106,351	1	1			2	213
PAPER SCANNERS	17,035	1				1	17
LASER PRINTERS	6,582	1	6			7	46
OPTICAL DISK DRIVE	70,643	2				2	141
MODEMS	475	1	5			6	3
						Subtotal	2,038
DESC							
MINICOMPUTERS	105,606		8	4		12	1,267
WORKSTATIONS	8,870		120	119		239	2,120
APERTURE SCANNERS	106,351		2	2		4	425
PAPER SCANNERS	17,035		1	1		2	34
LASER PRINTERS	6,582		7	2		9	59
OPTICAL DISK DRIVE	70,643		2			2	141
MODEMS	475		8	4		12	6
						Subtotal	4,053
DGSC							
MINICOMPUTERS	105,606		4	1		5	528
WORKSTATIONS	8,870		60	13		73	648
APERTURE SCANNERS	106,351		2			2	213
PAPER SCANNERS	17,035		1			1	17
LASER PRINTERS	6,582		6	2		8	53
OPTICAL DISK DRIVE	70,643		2			2	141
MODEMS	475		4	1		5	2
						Subtotal	1,602
DISC							
MINICOMPUTERS	105,606		9	1		10	1,056
WORKSTATIONS	8,870		135	31		166	1,472
APERTURE SCANNERS	106,351		2			2	213
PAPER SCANNERS	17,035		1	1		2	34
LASER PRINTERS	6,582		10	3		13	86
OPTICAL DISK DRIVE	70,643		2			2	141
MODEMS	475		9	1		10	5
						Subtotal	3,007

TABLE B-2 (CONTINUED)

EQUIPMENT/SITE	UNIT COST	FY89	FY90	FY91	FY92	TOT QTY	TOT COSTS (000s)
DPSC							
MINICOMPUTERS	105,606		6	1		7	739
WORKSTATIONS	8,870		65	15	15	95	843
APERTURE SCANNERS	106,351		2			2	213
PAPER SCANNERS	17,035		3	1		4	68
LASER PRINTERS	6,582		12	1		13	86
OPTICAL DISK DRIVE	70,643		2			2	141
MODEMS	475		6	1		7	3
Subtotal							2,093
DLSC							
MINICOMPUTERS	105,606		1			1	106
WORKSTATIONS	8,870		5			5	44
APERTURE SCANNERS	106,351		0			0	0
PAPER SCANNERS	17,035		1			1	17
LASER PRINTERS	6,582		1			1	7
OPTICAL DISK DRIVE	70,643		2			2	141
MODEMS	475		1			1	0
Subtotal							315
DFSC							
MINICOMPUTERS	105,606			1		1	106
WORKSTATIONS	8,870			5		5	44
APERTURE SCANNERS	106,351			2		2	213
PAPER SCANNERS	17,035			1		1	17
LASER PRINTERS	6,582			2		2	13
OPTICAL DISK DRIVE	70,643			2		2	141
MODEMS	475			1		1	0
Subtotal							535
DIPEC							
MINICOMPUTERS	105,606			1		1	106
WORKSTATIONS	8,870			5		5	44
APERTURE SCANNERS	106,351			2		2	213
PAPER SCANNERS	17,035			1		1	17
LASER PRINTERS	6,582			2		2	13
OPTICAL DISK DRIVE	70,643			2		2	141
MODEMS	475			1		1	0
Subtotal							535
Grand Total							14178

The CIOL workstation distribution is also shown by functional area in Table C-1.

Table B-3 provides a summary of Table B-2 contents by type of equipment and by year.

TABLE B-3

SUMMARY ADP EQUIPMENT REQUIREMENTS AND COSTS BY YEAR
(Initial Investment)

ADP EQUIPMENT	UNIT COST	FY89	FY90	FY91	FY92	TOT QTY	TOT COSTS
MINICOMPUTERS	105,606	1	33	9	0	43	4,541
WORKSTATIONS	8,870	15	460	209	15	699	6,200
APERTURE SCANNERS	106,351	1	9	6	0	16	1,702
PAPER SCANNERS	17,035	1	7	5	0	13	221
LASER PRINTERS	6,582	1	42	12	0	55	362
OPTICAL DISK DRIVE	70,643	2	10	4	0	16	1,130
MODEMS	475	1	33	9	0	43	20
EQUIPMENT COSTS (000s)		510	9,640	3,893	133		14,176

Table B-4 shows equipment replacement schedule and replacement costs. A five-year replacement cycle is used for the workstations and an eight year replacement cycle is used for the other ADP equipment. The workstations are assumed to have an eight year useful life and the other equipment a ten year useful life. Using straight-line depreciation, at the end of the five-year replacement cycle, the trade-in value of the old workstations will be three-eighths of the original price. At the end of the eight year replacement cycle, the trade-in value of the other equipment will be two-tenths of the original price. Thus, replacement costs are calculated as follows:

5/8 * unit cost for initial workstation investment = unit cost for replacement.

8/10 * unit cost for initial investment of other ADPE = unit cost for replacement

TABLE B-4

ADP EQUIPMENT REPLACEMENTS AND REPLACEMENT COSTS

ADP EQUIPMENT	UNIT COST	FY89 -FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	TOT QTY	TOT COSTS
MINICOMPUTERS	84,485	0	0	0	0	1	33	9	0	43	3,633
WORKSTATIONS	5,544	0	15	460	209	15	0	15	460	1,174	6,508
APERTURE SCANNERS	85,081	0	0	0	0	1	9	6	0	16	1,361
PAPER SCANNERS	13,628	0	0	0	0	1	7	5	0	13	177
LASER PRINTERS	5,266	0	0	0	0	1	42	12	0	55	290
OPTICAL DISK DRIVE	56,514	0	0	0	0	2	10	4	0	16	904
MODEMS	380	0	0	0	0	1	33	9	0	43	16
EQUIPMENT COSTS		0	83	2,550	1,159	385	4,448	1,715	2,550		12,800

Table B-5 shows only the total costs on a year by year basis for both initial equipment purchases and replacements. These are the figures that appear in the Life-Cycle Cost Element Structure for ADP equipment. (See Table 3.)

TABLE B-5
TOTAL ADP EQUIPMENT COSTS

INVESTMENT	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	TOTALS
Initial Inv	510	9,640	3,893	133	0	0	0	0	0	0	0	0	14,176
Replacement	0	0	0	0	0	83	2,550	1,159	385	4448	1,715	2,550	12,890
	----	-----	-----	---	---	---	-----	-----	---	---	---	-----	-----
Total/Year	510	9,640	3,893	133	0	83	2,550	1,159	385	4448	1,715	2,550	27,066

6 TELECOMMUNICATIONS

There is one LAN per CPU. The LAN costs are included in the minicomputer costs.

7 DATABASE DEVELOPMENT

The CTOL system requires development of a data base for storage of reference data used in cataloging operations. Table B-6 provides a breakdown of these data and the related development costs.

TABLE B-6
DATA BASE DEVELOPMENT COSTS

DESCRIPTION	QTY	UNIT COST	TOTAL
Data Base Equipment	1	\$226,077	\$ 226,077
Federal Item ID Guides (FIIGs)	460	843	\$ 387,780
Govt Industrial Spec Standards	1	2,108	2,108

Total \$ 615,965

The data base equipment is for the FIIG development. A description of the equipment is not available nor is the breakdown of the \$226,077 available. Source is the Systemhouse Federal, Inc., contract.

To obtain the unit cost for the FIIGs the following calculation was made:

It will take 16 hours to place 1 FIIG in the system @
\$52.69 per hour.

$$16 * \$52.69 = \$843 \text{ per FIIG}$$

The \$52.69 is a contract hour rate quote provided by Systemshouse Federal, Inc.

For the Government Industrial Specification Standards, the 40 hours are based on the experience with the prototype. The \$2108 is a one-time cost to configure the equipment to accept the standards input.

9 SOFTWARE DEVELOPMENT

CTOL systems are stand alone turnkey systems. All software needed will be commercial software.

10 COMMERCIAL SOFTWARE

Table B-7 provides descriptions and costs for the commercial software for CPUs needed for the CTOL stand alone turnkey systems.

TABLE B-7

COMMERCIAL SOFTWARE FOR CPUS (000s)

COMMERCIAL SOFTWARE	UNIT COST	NUMBER OF MINICOMPUTERS			TOTAL COSTS			TOTAL BY SOFTWARE TYPE
		FY89	FY90	FY91	FY89	FY90	FY91	
DMS	40,000	1	33	9	40	1,320	360	1,720
SCAN MASTER	40,000	1	33	9	40	1,320	360	1,720
ZIPNET	25,000	1	33	9	25	825	225	1,075
OPT DISK DRIVE	15,000	1	33	9	15	495	135	645
CTOL APPLICATION	15,000	1	33	9	15	495	135	645
DECMICROVMS	9,600	1	33	9	10	317	86	413
TOTAL COMMERCIAL SOFTWARE COSTS/YEAR					145	4,772	1,301	6,218

The unit costs for the CTOL software were obtained from Contract DHAH-8-ZSA-10.

11 DOCUMENTATION

Documentation costs for the minicomputers and workstations are presented in Table B-8 below.

TABLE B-8

DOCUMENTATION COSTS

FY89

DESCRIPTION	QTY	UNIT COST	TOTAL
Users & System	1	\$2,272	\$2,272

FY90

Description	Qty	Unit Cost	Totals
Users & System	33	\$2,272	\$74,976

FY91

Description	Qty	Unit Cost	Totals
Users & System	9	2,272	\$20,448

12 TEST AND EVALUATION

DLA personnel will assume all test and evaluation responsibilities.
See note 23.

13 TECH AND INTEGRATION SUPPORT

DLA personnel will provide all technical and integration support.
See note 24.

SYSTEM INVESTMENTS (GOVERNMENT PROVIDED)

15 PROGRAM MANAGEMENT

The CTOL program management costs are based on a GS 14, step 5, salary. Calculations are shown in Table B-9.

TABLE B-9

PROGRAM MANAGEMENT COSTS

Annual salary	\$ 52,903
# of workyears	x .50
Leave adjustment	x 1.18
<hr/>	
Annual salary pd equiv	\$ 31,213
Fringe benefits	+ 31,213 x .2955
Management overhead	+ 31,213 x .1000
<hr/>	
Program mgmt costs/year	\$43,558
# years	x 5
<hr/>	
Total program mgmt costs \$ 217,790	

1. Annual salaries were obtained from the Office of Personnel Management, 1988 Pay Table for General Schedule (GS) Grades for Those Paid Every Two Weeks.

2. The fringe benefit rate (29.55%) was obtained from the Office of Management and Budget Circular No. A-94 (Revised) Transmittal Memorandum No. 7, 28 September 1988.

3. The management overhead rate (10%) appears in the SAMMS-M Project Development Plan, 1 December 1985.

17 ADP EQUIPMENT

There will be no government provided ADP equipment.

18 TELECOMMUNICATIONS

There will be no government provided ADP telecommunications costs.

20 SOFTWARE DEVELOPMENT

All software will be commercial software.

21 GOVERNMENT FURNISHED SOFTWARE

None.

22 TEST AND EVALUATION

Functions performed in test & evaluation and times to perform these functions on the workstations are as follows:

Unpack/setup/initial run	45 minutes
Installation of additional components	30 minutes
	<hr/>
	75 minutes

This information was obtained from the DLA System Automation Center (DSAC) at Columbus, Ohio, and was based on their personal computer test and evaluation experience. Test and evaluation costs are based on the personnel equivalent cost of \$31,412, including fringe benefits (29.55%) and leave (18%), and the number of hours required per terminal. Table B-10 gives calculations for test and evaluation costs.

TABLE B-10

TEST AND EVALUATION COSTS (GOVT PROVIDED)

FISCAL YEAR	NUMBER OF TERMINALS	NUMBER OF HOURS	HOURLY WAGE	COST PER YEAR
89	15	1.15	\$ 23.01	\$ 397
90	460	1.15	23.01	12,172
91	209	1.15	23.01	5,530
92	15	1.15	23.01	397
93	0	1.15	23.01	0
94	15	1.15	23.01	397
95	460	1.15	23.01	12,172
96	209	1.15	23.01	5,530
97	15	1.15	23.01	397
98	0	1.15	23.01	0
99	15	1.15	23.01	397
00	460	1.15	23.01	12,172

Total Test & Evaluation Costs \$ 49,561

23 INTEGRATION

Integration functions for the workstations and times to perform functions are as follows:

Burn in period	8.0 hours
Repack/deliver/unpack/install	.5 hours

Total Integration Time 8.5 hours

This information was obtained from DSAC and was based on their experience with personal computer integration. Integration costs for the CTOL workstations are calculated in Table B-11.

TABLE B-11

INTEGRATION COSTS

FISCAL YEAR	NUMBER OF TERMINALS	NUMBER OF HOURS	HOURLY WAGE	COST PER YEAR
89	15	8.5	\$ 23.01	\$ 2,934
90	460	8.5	23.01	89,969
91	209	8.5	23.01	40,877
92	15	8.5	23.01	2,934
93	0	8.5	23.01	0
94	15	8.5	23.01	2,934
95	460	8.5	23.01	89,969
96	209	8.5	23.01	40,877
97	15	8.5	23.01	2,934
98	0	8.5	23.01	0
99	15	8.5	23.01	2,934
00	460	8.5	23.01	89,969
Total Integration Costs				\$ 366,331

SUPPORT INVESTMENT

27 SITE PREPARATION

The site preparation costs for the CTOL environment are based on the following considerations:

Electrical	\$ 5,000
Communications	1,000
Cabling	2,000
Lighting	1,000
Analysis/review of site	1,000
<hr/>	
	\$10,000

Table B-12 gives the estimated site preparation costs for the CTOL AIS.

TABLE B-12

SITE PREPARATION COSTS FOR
CTOL MINICOMPUTER/WORKSTATIONS

YEAR	# SITES	ESTIMATED COSTS	TOTAL
FY89	1	\$ 10,000	\$ 10,000
FY90	5	10,000	50,000
FY91	2	10,000	20,000
<hr/>			\$ 80,000

The CTOL site preparation costs are estimated on the basis of site preparation costs for the CTOL prototype.

28 INITIAL TRAINING

Training costs are based on the following scenario. Contractor will provide training for thirty employees in a two week training session for \$5000. The employees who are trained will in turn provide training to those who still need training. The initial thirty trainees are assumed to be at the GS11, step 5, level.

The opportunity cost represents the salary the employee continues to receive while in training. The employer sacrifices this time in which the employee would be on the job. See Note 31 for personnel descriptions and average grade levels. The opportunity cost is calculated as follows:

hours to train x hourly rate including fringe benefits

Table B-13 provides calculations for initial training costs.

TABLE B-13

INITIAL TRAINING COSTS

TYPE OF TRAINING	TRAINER COST	# EMPLOYEES	FY89		ACCELERATION FACTOR	TOTAL COSTS
			WAGES/HOUR	OPPORTUNITY COST		
Contractor Provided	\$ 5,000	15	15.05	\$ 18,060	1.3955	\$ 30,203
		15	10.47	12,564	1.3955	17,533
Total FY89		30				47,736

Opportunity costs = 80 hours * 15.05/hr * 15 employees + 80 hours * 10.47/hr * 15 employees

FY90

Government Provided	60	15.05	\$ 72,240	1.3955	\$ 100,811
	81	13.54	87,739	1.3955	122,440
	189	10.47	158,306	1.3955	220,916
	100	7.34	58,720	1.3955	81,944
	15	15.05	18,060	1.3955	25,203
Total FY90	445		\$ 395,065		\$ 551,314

Opportunity costs = 80 hours * 15.05/hr * 60 employees (GS11, step 5)
 +80 hours * 13.54/hr * 81 employees (GS 9, step 8)
 +80 hours * 10.47/hr * 189 employees (GS 7, step 6)
 +80 hours * 7.34/hr * 100 employees (GS 4, step 5)
 +80 hours * 15.05/hr * 15 trainer equivalents (GS11, step 5)

Trainer equivalents = # employees to be trained / 30 trainees per two week session.

TABLE B-13 (CONTINUED)

TYPE OF TRAINING	TRAINER COST	# EMPLOYEES	WAGES/HOUR	OPPORTUNITY COST	FACTOR	TOTAL COSTS
FY91						
Government Provided		26	13.54	\$ 28,163	1.3955	\$ 39,302
		161	10.47	134,854	1.3955	188,189
		22	7.34	12,918	1.3955	18,027
		7	15.05	7,582	1.3955	10,581
Total FY91		216				\$256,099
Opportunity costs = 80 hours * 13.54/hr * 26 employees (GS9, step 8) +80 hours * 10.47/hr * 161 employees (GS7, step 6) +80 hours * 7.34/hr * 22 employees (GS4, step 5) +80 hours * 13.54/hr * 7 trainer equivalents (GS11, step 5)						
FY92						
Government Provided		15	10.47	\$ 12,564	1.3955	\$ 17,533
		1	15.05	1,204	1.3955	1,680
Total FY92		16		\$ 13,768		\$ 19,213
Opportunity costs = 80 hours * 10.47/hr * 15 employees +80 hours * 15.05/hr * 1 trainer equivalent						

31 OPERATING PERSONNEL

Operating personnel are equipment operators located in the various OTIS offices. When CTOL is fully implemented, no operators will be dedicated to CTOL since the CTOL systems are stand alone turnkey systems. The operators will continue to be needed for other AISs which are a part of DLA's Logistics Systems Modernization Program (LSMP) and so, no operating personnel reductions are anticipated.

33 ADPE MAINTENANCE

CTOL system hardware have 90 day warranties. The CTOL maintenance costs were obtained from the Systemhouse Federal, Inc., contract and are presented in Table B-14 by year.

TABLE B-14

CTOL HARDWARE MAINTENANCE COSTS

FISCAL YEAR	NO OF SYSTEMS 90 DAY WARRANTY	NO OF SYSTEMS FULL YEAR	UNIT COST 75%	UNIT COST 100%	TOTAL COSTS
88	1	0	\$42,930	\$57,240	\$ 42,930
89	1	1			100,170
90	33	1			1,473,930
91	9	34			2,332,530
92	0	43			2,461,320
93	0	43			2,461,320
94	0	43			2,461,320
95	0	43			2,461,320
96	0	43			2,461,320
97	0	43			2,461,320
98	0	43			2,461,320
99	0	43			2,461,320
00	0	43			2,461,320

Total Hardware Maintenance Costs FY89-FY00

\$26,101,440

Table B-15 includes annual site license costs which includes software maintenance for the CTOL workstations.

TABLE B-15

WORKSTATION SITE LICENSE COSTS
(000s)

UNIT COST	NUMBER OF WORKSTATIONS												TOTAL COST
	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	
5,000	15	475	684	699	699	699	699	699	699	699	699	699	
COST/YR	75	2,375	3,420	3,495	3,495	3,495	3,495	3,495	3,495	3,495	3,495	3,495	37,325

34 DATA BASE MAINTENANCE

The annual cost of data base updating is shown in Table B-16 and covers the cost of one personnel equivalent to maintain software and keep 5 years of data current.

TABLE B-16

DATA BASE MAINTENANCE COSTS

Annual salary	\$31,412	
Fringe benefit	x 1.2955	
		<hr/>
Salary with benefits	\$40,694	
Leave factor	x 1.18	
		<hr/>
Salary for paid equiv	\$48,019	
FY89-00		
Annual Database Updating	48,019	
	x 13 years	
		<hr/>
Total Database Costs FY89-00	\$624,247	

36 SUPPLIES

Annual costs for supplies for both alternatives are estimated to be approximately the same. Supplies for Alternative B include laser disks and other computer supplies. DESC annual supply costs in FY84 were \$5,000. One of the major assumptions in this EA is that workload will remain constant. Thus, no increase in supply requirements is anticipated. With the assumption that supply costs are approximately the same at each center, FY84 dollars were adjusted to FY88 dollars using Total Obligational Authority (TOA) indices from National Defense Budget Estimates for FY88/89, OASD (C), April 1987 (Table 5-4, Page 52.) Calculation of annual supply costs is presented in Table B-17 below.

TABLE B-17

ANNUAL SUPPLY COSTS

	# SITES	ANNUAL COST	TOA FACTOR	ANNUAL SUPPLY COSTS
	<hr/>	<hr/>	<hr/>	<hr/>
37 TRAVEL	8	\$5,000	100/88.05	\$45,429

These costs include air transportation between Headquarters DLA, the DSCs, DPSC, DLSC, and DIPEC plus lodging, meals, and local transportation. Starting in Project Year 5 (FY90), travel costs will be approximately \$2,000 annually.

OTHER

39 TERMINAL VALUE

At the end of the CTOL project life, much of the ADP equipment will have remaining useful life. The terminal value of the equipment is calculated in Table B-18 below using straight line depreciation over an 8-year useful life.

TABLE B-18

TERMINAL VALUE

FISCAL YEAR	INVESTMENT (000s)	REMAINING USEFUL LIFE	TERMINAL VALUE
94	\$ 133	1/8	\$ 17
95	4,080	2/8	1,020
96	1,854	3/8	695
97	133	4/8	67
	377	6/10	226
98	5,560	7/10	3,892
99	133	6/8	100
	1,978	8/10	1,582
00	4,080	7/8	3,570
Total Terminal Value FY00			\$ 11,169

APPENDIX C - BENEFITS

A breakdown of quantifiable and nonquantifiable benefits is presented below. The quantifiable benefits include improved processing times, improved work quality and improved work control. The nonquantifiable benefits include reduced administrative leadtimes and future expansion capabilities. The identification of benefits and measurement of quantified benefits are in accordance with the DLA-SCC functional development objective and have been approved by the DLA-SCC management.

I. Quantifiable Benefits

A. Improved Processing Times

Table C-1 identifies workstation requirements by functional area and by site. The workstation requirements for item identification processes were based on FY88 workload data. Other requirements were determined on the basis of information provided in the October 1988 Request for Proposals for the CTOL AIS.

TABLE C-1

WORKSTATION REQUIREMENTS IN CATALOGING OPERATIONS, TECH DATA, AND TECH DATA SERVICES

SITE/FUNCTION	ITEM IDENTIFICATION		TECH DATA	TECH DATA SERVICES	QTY BY SITE
	PROCESSORS	SUPERVISORS			
DCSC	86	11	2	9	108
DESC	124	10	45	60	239
DGSC	51	10	1	6	68
DISC	89	9	53	15	166
DPSC	30	12	12	11	65
DLSC	0	0	3	2	5
DFSC	0	0	3	2	5
DIPEC	0	0	3	2	5
Totals By Function	380	52	122	107	661

Table C-2 includes FY88 workload data for item identification processing and times required to process the actions. These data are then converted to personnel requirements for both alternatives. Annual costs for each alternative are calculated and the difference in these costs will be the annual cost savings due to improved processing times. For Alternative A, the times were obtained from the DLA Management Engineering Standards (DIMES) Special Purpose Data Standards during November 1983. To calculate time saved under Alternative B, times for those process steps which will be eliminated are totaled. The eliminated steps were identified by DLA-ZSM and functional users through actual observations during May 1984, of the item identification processes in DGSC cataloging operations.

The functional personnel requirements in Table C-2 for Alternative B and the workstation requirements for item identification workload processing shown in Table C-1 show a one-to-one relationship between them. Only item identification are considered in determining functional personnel savings. Assuming the workload will remain constant, an annual cost savings of \$5,324,000 (undiscounted FY88 dollars) will occur as a result of improved processing times when CTOL is fully implemented.

TABLE C-2

PERSONNEL COSTS/COST SAVINGS

	WORKLOAD PROCESSING TIMES (HRS)			WORKLOAD FY88	NUMBER OF WORKYEARS			PAID EQUIVALENTS		
	ALT A	ALT B	TIME SAVED		ALT A	ALT B	WRKYR SAVED	ALT A	ALT B	PD EQUIV SAVED
DCSC										
REQUEST	4.2	2.5	1.7	27,455	55.3	32.9	22.4	65.2	38.8	26.4
TRANSFER	1.6	1.2	0.4	14,086	10.8	8.1	2.7	12.7	9.6	3.2
REVISION	1.4	1.1	0.3	27,439	18.4	14.5	3.9	21.7	17.1	4.7
CANCEL	1.6	1.4	0.2	5,826	4.5	3.9	0.6	5.3	4.6	0.7
ADD,DEL,CHNG	1.0	0.8	0.2	34,752	16.7	13.3	3.3	19.6	15.7	3.9
SITE TOTALS				109,558	105.6	72.7	32.9	124.6	85.8	38.8
PERSONNEL REQD/SAVD								125	86	39
PERSONNEL COSTS/SAVINGS (000s)								\$3,891	\$2,677	\$1,214
DESC										
REQUEST	4.2	2.5	1.7	29,535	59.4	35.4	24.1	70.1	41.7	28.4
TRANSFER	1.6	1.2	0.4	27,050	20.7	15.6	5.2	24.5	18.4	6.1
REVISION	1.4	1.1	0.3	22,872	15.3	12.1	3.3	18.1	14.2	3.9
CANCEL	1.6	1.4	0.2	31,361	24.0	21.0	3.0	28.4	24.8	3.5
ADD,DEL,CHNG	1.0	0.8	0.2	53,772	25.8	20.6	5.2	30.4	24.3	6.1
SITE TOTALS				164,590	145.3	104.6	40.7	171.5	123.5	48.0
PERSONNEL REQD/SAVD								172	124	48
PERSONNEL COSTS/SAVINGS (000s)								\$5,355	\$3,860	\$1,494
DGSC										
REQUEST	4.2	2.5	1.7	13,868	27.9	16.6	11.3	32.9	19.6	13.3
TRANSFER	1.6	1.2	0.4	6,506	5.0	3.7	1.2	5.9	4.4	1.5
REVISION	1.4	1.1	0.3	20,599	13.8	10.9	3.0	16.3	12.8	3.5
CANCEL	1.6	1.4	0.2	2,141	1.6	1.4	0.2	1.9	1.7	0.2
ADD,DEL,CHNG	1.0	0.8	0.2	26,159	12.5	10.0	2.5	14.8	11.8	3.0
SITE TOTALS				69,273	60.9	42.7	18.2	71.9	50.4	21.5
PERSONNEL REQD/SAVD								72	51	21
PERSONNEL COSTS/SAVINGS (000s)								\$2,241	\$1,588	\$654
DISC										
REQUEST	4.2	2.5	1.7	45,319	91.2	54.3	36.9	107.6	64.1	43.6
TRANSFER	1.6	1.2	0.4	6,484	5.0	3.7	1.2	5.9	4.4	1.5
REVISION	1.4	1.1	0.3	11,192	7.5	5.9	1.6	8.9	7.0	1.9
CANCEL	1.6	1.4	0.2	5,327	4.1	3.6	0.5	4.8	4.2	0.6
ADD,DEL,CHNG	1.0	0.8	0.2	19,330	9.3	7.4	1.9	10.9	8.7	2.2
SITE TOTALS				87,652	117.0	74.9	42.1	138.1	88.4	49.7
PERSONNEL REQD/SAVD								139	89	50
PERSONNEL COSTS/SAVINGS (000s)								\$4,327	\$2,771	\$1,557

TABLE C-2 (CONTINUED)

	WORKLOAD PROCESSING TIMES (HRS)			WORKLOAD FY88	NUMBER OF WORKYEARS			PAID EQUIVALENTS		
	ALT A	ALT B	TIME SAVED		ALT A	ALT B	WKYR SAVED	ALT A	ALT B	PD EQUIV SAVED
DPSC										
REQUEST	4.2	2.5	1.7	9,866	19.9	11.8	8.0	23.4	13.9	9.5
TRANSFER	1.6	1.2	0.4	1,299	1.0	0.7	0.2	1.2	0.9	0.3
REVISION	1.4	1.1	0.3	7,708	5.2	4.1	1.1	6.1	4.8	1.3
CANCEL	1.6	1.4	0.2	1,566	1.2	1.1	0.2	1.4	1.2	0.2
ADD,DEL,CHNG	1.0	0.8	0.2	19,139	9.2	7.3	1.8	10.8	8.7	2.2
SITE TOTALS				39,578	36.4	25.0	11.4	42.9	29.5	13.4
PERSONNEL REQD/SAVD								43	30	13
PERSONNEL COSTS/SAVINGS (000s)								\$1,339	\$934	\$405
TOTAL WKYRS/PAID EQUIV					465.2	319.9	145.3	549.0	377.5	171.5
TOTAL PERSONNEL REQD/SAVD								551	380	171
TOTAL PERSONNEL COSTS/SAVINGS (000s)								\$17,154	\$11,830	\$5,324

Calculations in Table C-2 are based on the following formulas:

1. Number of workyears required to process workload actions =
Workload * time to process action / 2087 hours per workyear.
2. Number of paid equivalents =
Number of workyears required * 1.18 (leave factor).
3. Number of personnel required =
Number of paid equivalents rounded up one.
4. Annual salary =
GS7/6 salary of \$21,846 * 1.3955 (includes 29.55% in fringe benefits and 10% management overhead).
5. Annual costs/cost savings =
Number of personnel required * annual salary.

Workload data and other factors used in the calculations were obtained from the following sources:

1. FY88 workload data were obtained from the DLA RCS Report, October 1988.
2. The annual salary for a GS7, Step 6, was obtained from the Office of Personnel Management, 1988 Pay Table for General Schedule (GS) Grades for Those Paid Every Two Weeks. In the original EA dated August, 1986, the annual salary for a GS 7, Step 4, was used in calculations. The GS7, step 6, grade level in this update reflects the passage of two years since the original EA was completed.
3. The fringe benefit rate was obtained from the Office of Management and Budget Circular No. A-94 (Revised) Transmittal Memorandum No. 7, 28 September 1988.
4. The management overhead rate appears in the SAMMS-M Project Development Plan, 1 December 1985.

B. Work Quality

Table C-3 shows the DLSC/SAMMS edit reject workload for FY88 under current cataloging operations and the annual savings if edit rejects are eliminated.

TABLE C-3

DLSC/SAMMS EDIT REJECT SAVINGS UNDER ALTERNATIVE B

SITE	ALT A REJECTS PER YEAR	ALTB REJECTS PER YEAR	REJECTS ELIMINATED ALT B	NUMBER OF WORKYEARS SAVED	NUMBER OF PAID EQUITV SAVED	NUMBER OF PERSONNEL SAVED	ANNUAL SALARY	ANNUAL COST SAVINGS
DCSC	39,276	0	39,276	6.27	7.40	8	30,486	243,888
DESC	32,244	0	32,244	5.14	6.07	7	30,486	213,402
DGSC	30,348	0	30,348	4.84	5.71	6	30,486	182,916
DISC	30,120	0	30,120	4.81	5.68	6	30,486	182,916
DPSC	6,828	0	6,828	1.09	1.29	2	30,486	60,972
RJECTS/YR	138,816	0	138,816	22.15	26.15	29		884,094

Formulas used to calculate edit reject personnel savings include the following:

1. Estimated number of rejects per year =
Number of rejects per month (Oct 88) * 12 months.
2. Estimated time to process one reject = 20 minutes (approximately .333 hours).
3. Number of workyears saved =
Number of rejects per year * .333 hours / 2087 workhours per year.
4. Number of paid equivalents saved =
Number of workyears saved * 1.18 (leave adjustment factor).
5. The number of personnel required =
Number of paid equivalents rounded up to the nearest whole number.
6. Annual salary =
GS7/6 salary of \$21,846 plus 29.55% of salary in fringe benefits and 10% of salary in management overhead.
7. Annual cost savings =
Number of personnel required * annual salary.

Sources of data used in calculations include the following:

1. Source of the reject data is Department of Defense Integrated Data Systems Procedures Manual (DoD 4100.39-M, Vol 14), CS82D Report: Input/Output Document Identifier Code Summaries, October 1988.
2. Estimated time to process one reject obtained from the Technical Data and Logistics Services Office, Cataloging Operations Supervisor at DCSC, October 1988.
3. See sources (2,3,4) on page C-3 for salaries, fringe benefits, and management overhead.

C. Improved Work Control

The original CTOL EA showed a personnel savings of 139 through the elimination of positions for data entry, control, and quality review. Because of budget constraints placed on DLA since the original EA, some of these positions were eliminated in advance of CTOL AIS implementation. Thus, only a portion of these positions will be counted in this CTOL EA update. Calculations for personnel savings due to improved work control are presented in Table C-4.

TABLE C-4

WORK CONTROL PERSONNEL SAVINGS PER YEAR

SITE	PERSONNEL SAVED	SALARY	UNADJUSTED TOTAL SALARY	ACCELERATION FACTOR	PERSONNEL SAVINGS
DCSC	32	\$21,846	\$ 699,072	1.3955	\$ 975,555
DESC	29	21,846	633,534	1.3955	884,097
DGSC	2	21,846	43,692	1.3955	60,972
DISC	27	21,846	589,842	1.3955	823,125
DPSC	9	21,846	196,614	1.3955	274,375
TOTALS	99		\$ 2,162,754		\$ 3,018,124

At DCSC, the prototype is in full operation and 27 of the 32 personnel will be eliminated in FY88, and the remaining five will be eliminated in FY90 when the CTOL production system begins full operation.

II. Nonquantifiable Benefits

A. Reduced Administration Lead Time (ALT)

Alternative A requires excessive ALT to obtain new NSNs. Current policies allow 60 days to obtain an NSN. This 60-day timeframe will be significantly reduced by automated processing enhancements and on-line management control of the cataloging transactions. In the Accelerated Cataloging/Mechanized Entry (ACME) Feasibility and Cost Benefit Analysis, it was estimated that the 60 maximum days currently required to obtain a new NSN will be reduced to 30 days, a 50% time reduction. Sources of ALT delay under current system include the routine for handling errors, management workload and movement of paperwork.

B. Future Interface Capabilities

The ADP equipment for Alternative B will provide the future capability to electronically interface, from CTOL workstations, with other Military Services, DSCs, private industry and government agencies equipment for the transfer and receipt of text and graphic data.[1] Electronic interfacing would require that the Services and other government agencies purchase the ADP equipment shown in Table C-5. At this time it is not possible to quantify benefits, but these organizations should realize benefits similar to those shown in this appendix.

TABLE C-5

ADP EQUIPMENT OPTIONS AND COSTS FOR MILITARY SERVICES/GOVT. ORGANIZATIONS

ADP EQUIPMENT	UNIT COST	USAF	DNA	USM	USA	USN	DLA	GSA	VA	TOT QTY	TOT COST
MINICOMPUTERS	105,606	7	1	1	5	6	4	1	1	26	2,746
WORKSTATIONS	8,870	129	15	10	100	100	68	40	20	482	4,275
APERTURE SCANNERS	106,351	3	0	1	2	2	2	1	1	12	1,276
PAPER SCANNERS	17,035	3	0	1	2	2	2	1	1	12	204
LASER PRINTERS	6,582	7	1	1	5	6	2	1	1	24	158
OPTICAL DISK DRIVE	70,643	4	0	2	2	4	4	2	2	20	1,413
MODEMS	475	7	1	1	5	6	2	1	1	24	11
TOTAL EQUIPMENT COSTS		2,586	246	466	1,838	2,092	1,569	732	555		10,083

III. Proration of Benefits During Leadtime Years

The CTOL production systems will be phased in during leadtime years FY89-91 with full operation beginning in FY92. Table C-6 shows calculations for determining the benefits which will be realized during leadtime years.

TABLE C-6

PRORATION OF FUNCTIONAL PERSONNEL BENEFITS

FISCAL YEAR	ALTERNATIVE B PERSONNEL BENEFITS (000s)	PRORATION FACTOR	ALTERNATIVE B PRORATED BENEFITS (000s)
88	\$ 9,226	.00	\$ 0
89	9,226	.04	369
90	9,226	.72	6,643
91	9,226	.99	9,134
92-00	9,226	1.00	9,226

The proration factor was based on the ratio of ADP equipment investment costs in a particular year to total ADP equipment investment costs for FY88-92. The fact that some benefits were realized at DCSC in FY88 due to the implementation of the prototype was not taken into consideration here. Thus, FY88-89 estimation of benefits is a conservative one.

APPENDIX D

SUNK COSTS FOR ALTERNATIVE B

During fiscal years 1986 and 1987, a CTOL prototype was designed and developed at the Defense Construction Supply Center in Columbus, Ohio. During this time, DLA acquired needed hardware and software. A data base which included ten FIIGs was also developed. In FY88, the prototype was fully implemented.

An economic analysis includes estimates and analyses of future costs. Thus, sunk costs are excluded since they are actual costs and represent the past. Sunk costs are provided in this appendix for informative purposes only. These costs are stated in FY88 undiscounted dollars. In Table D-1, an accounting of the sunk costs which were incurred during FY86-87 is provided.

TABLE D-1

CTOL PROTOTYPE SUNK COSTS

ADP EQUIPMENT	UNIT COST	FY86	FY87	TOTALS	GRAND TOTAL
MINICOMPUTERS	93,898	1	0	93,898	
WORKSTATIONS	16,250	5	0	81,250	
APERTURE SCANNERS	111,261	1	0	111,261	
PAPER SCANNERS	19,368	1	0	19,368	
			0	0	
LASER PRINTERS	10,652	1	0	10,652	
OPTICAL DISK DRIVE	41,236	2	0	82,472	
MODEMS	475	1	0	475	
ADP EQUIPMENT COSTS					399,376
COMMERCIAL SOFTWARE					
DVMS	40,000		1	40,000	
SCAN MASTER	40,000		1	40,000	
QC MASTER	20,000		1	20,000	
OPT DISK DRIVER	15,000		1	15,000	
PRINT QUEUE	15,000		1	15,000	
WORKSTATION	10,000		4	40,000	
COMMERCIAL SOFTWARE COSTS					170,000
DOCUMENTATION					
USER/SYSTEM MANUAL	568		1	568	568
DATA BASE DEVELOPMENT					
EQUIPMENT	226,077	1		226,077	
FIIG DEVELOPMENT	53 PER HOUR	162		8,536	
SPECS/STANDARDS	53 PER HOUR	40		2,108	
EQUIP UPDATE	47,093 PER YEAR	1	1	94,186	
DATA BASE DEVELOPMENT COSTS					330,906
HW/SW MAINTENANCE	4,770 PER MONTH		9	42,930	42,930
TOTAL SUNK COSTS					\$943,780

The contractor for the prototype was Federal Systems House Systems, Inc., who was subcontracted under the Library of Congress Contract #DHAH-8-ZSA-10.

APPENDIX E

References

The following references pertain to reference numbers in the main body of the economic analysis and not the appendices.

1. DLA-SCC, Telephone conversation between J.W. Hickman and Jan Rider, October 1988.
2. ADP Systems Engineering/Technical Support Services, SAMMS Modernization Preliminary Economic Analysis, Final Report, OTIS.
3. Application Study, Cataloging Tools On-Line, DLA Systems Automation Center (DSAC), Control Number A908.
4. Cataloging Tools On-Line Functional Description, DSAC, 4 December 1985.
5. DLA-OSS, Telephone conversations between Dennis Heretick and Jan Rider, August 1986.
6. Economic Analysis, DLAM 7041.1, May 1985, Chapter 3 (p. 2), Chapter 5 (pp. 1-4), Chapter 13 (pp. 1-2), Chapter 14 (pp. 1-3).
7. Economic Analysis for Decision Making, U.S. Army Mangement Engineering Training Agency, January 1985, Chapters 7-8 (pp. 71-101).
8. DLA-SC IOM, 6 February 1989, subject: Cataloging Tools On-Line (CTOL) Automated Information System (AIS) Economic Analysis.
9. Accelerated Cataloging/Mechanized Entry (ACME) Feasibility and Cost Benefit Analysis, Final Report, 2 February 1984, Office of Telecommunications and Information Systems (OTIS).
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